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FARMERS' BULLETIN ~ 1184  
UNITED STATES DEPARTMENT OF AGRICULTURE

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# GINSENG CULTURE



**G**INSENG is a fleshy-rooted herbaceous plant native to this country and formerly of frequent occurrence in shady, well-drained situations in hardwood forests from Maine to Minnesota and southward in the mountain regions to Georgia and the Carolinas.

When placed under culture ginseng should be shielded from direct sunlight by the shade of trees or by lath sheds. The soil should be fairly light and well fertilized with woods earth, rotted leaves, or fine raw bone meal. Seed should be planted in the spring, as early as the soil can be worked. Only cracked or partially germinated seed should be used. Ginseng needs little cultivation, but the beds should at all times be kept free from weeds and grass. A winter mulch over the crowns is usually essential.

The roots do not reach marketable size until about the sixth year from seed. When dug they should be carefully washed or shaken free of all adhering soil, but not scraped. Curing is best effected in a well-ventilated room heated to about 90° F. Nearly a month is required to cure the larger roots.

The average value of the exports of ginseng from the United States for the past 12 years is \$1,720,595.

Ginseng production is a minor industry which affords an opportunity for profit to only a limited number of judicious growers.

Contribution from the Bureau of Plant Industry

WM. A. TAYLOR, Chief

Washington, D. C.

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## GINSENG CULTURE<sup>1</sup>

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GINSENG is a native product of recognized importance. The export trade in dry roots has existed for more than a century and for the last 15 years attained an average annual value of over a million dollars.

The natural production of ginseng, diminished by overcollection and the contraction of suitable forest areas, has dwindled to such an extent that prices have risen to levels warranting cultivation, which has proved successful in judicious hands. The plant, however, has little domestic value except for the exploitation of amateur cultivators and depends on a distant oriental market (China) for its standing as a commodity. As a commercial product it would appear particularly liable to overproduction, which danger, however, is greatly lessened by the slow development of the plant and the inherent difficulties of its cultivation.

Under the present conditions of production ginseng offers attractive possibilities to patient cultivators who appreciate the limitations of growth and the slow development of woodland plants in general, and are willing to make a material outlay with only scanty returns in view for several years to come, but it holds out no inducement for inexperienced growers looking for quick profits from a small investment.

The culture of ginseng and of special crops generally is best begun in an inexpensive and experimental manner, enlarging the equip-

<sup>1</sup> Much of the information in this bulletin has been taken almost verbatim from Farmers' Bulletin 551, by Dr. Walter Van Fleet, issued in 1913.

ment only as reasonable success seems assured. "Plunging" in ginseng is as likely to prove disastrous as in other forms of business.

### THE GINSENG PLANT.

American ginseng (fig. 1), botanically known as *Panax quinquefolium* of the family Araliaceæ, is a fleshy rooted herbaceous plant.

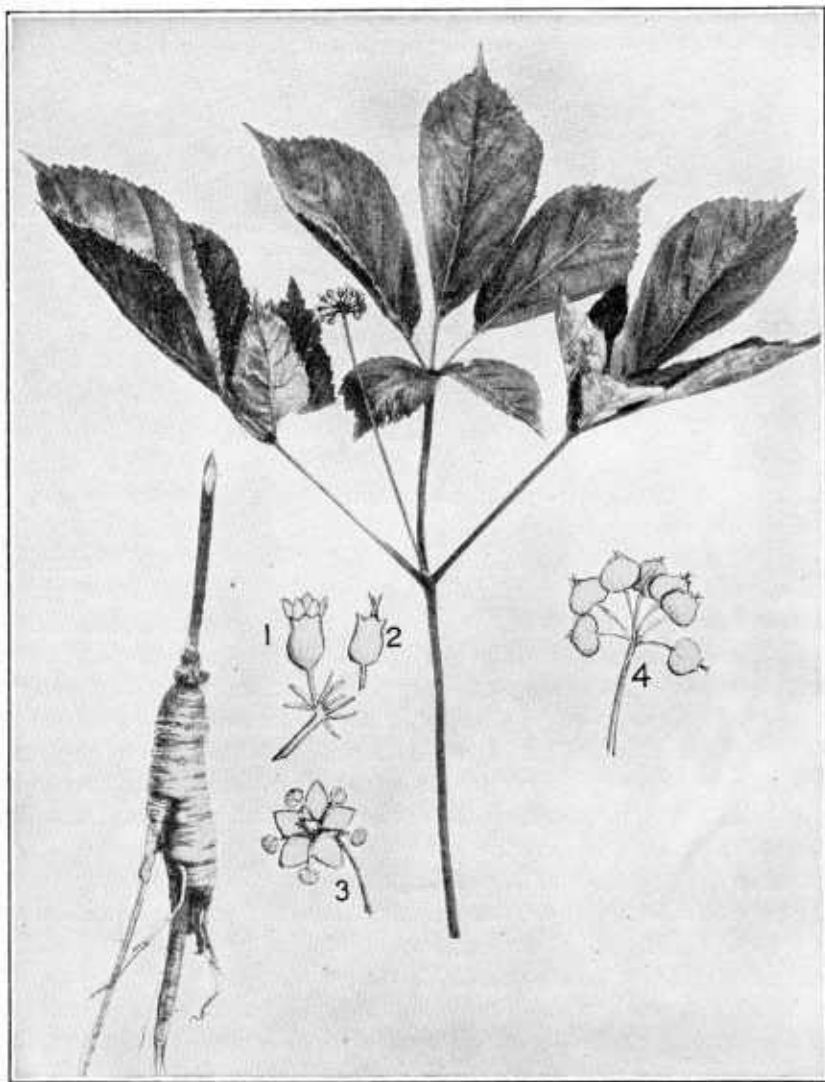


FIG. 1.—Branch, root, flower, and berries of American ginseng.

growing naturally on the slopes of ravines and in other shady but well-drained situations in hardwood forests, in varying abundance from Maine to Minnesota and southward in the mountain regions to

Georgia and the Carolinas. In its wild state it grows from 8 to 20 inches high, bearing three or more compound leaves, each consisting of five thin, stalked, ovate leaflets, pointed at the apex and rounded or narrowed at the base, the three upper leaflets being larger than the two lower ones. A cluster of from 6 to 20 small greenish yellow flowers is produced in midsummer, followed by as many bright-crimson berries, each containing from one to three flattish wrinkled seeds the size of small peas.

The root is thick, spindle shaped, 2 to 4 inches long, and  $\frac{1}{2}$  to 1 inch or more in thickness, in the older specimens generally branched and prominently marked with circular wrinkles. Branched roots having some resemblance to the human form are said to be in particularly high favor in China.

The seeds (fig. 2) are slow in germination and should never be permitted to become dry. As soon as they are gathered they should be mixed with twice their bulk of moist sand, fine loam, old sawdust, or woods earth, and stored in a damp, cool place until they are planted. As a rule the seeds do not germinate until a year from the spring following their ripening, and this fact must be borne in mind in purchasing seed for planting.

Ginseng seedlings grow about 2 inches high the first year, with three leaflets at the apex of the stem. The second-year plants may reach a height of 5 or 6 inches, bearing two compound leaves, each composed of five characteristic leaflets. A third leaf is generally added the next year, when fruits may be expected. In succeeding years a fourth leaf is formed and the fruiting head reaches its maximum development, sometimes producing as many as 100 seeds, but the average under cultivation seldom exceeds 40 seeds to a plant.

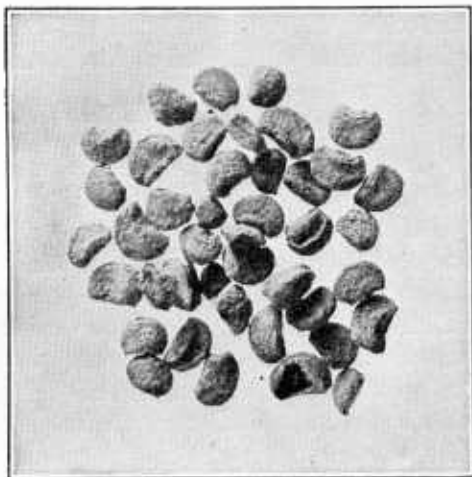


FIG. 2.—Seeds of American ginseng. (Natural size.)

### VARIETIES.

There are various recognizable geographical races of American ginseng, not all of which are of the same value to the grower. Plants from the northern range, particularly those indigenous to New York and Wisconsin, appear to possess the most useful characteristics and

form the best basis for breeding stocks. Southern ginseng, though vigorous and forming roots of good size and shape, does not seed well in northern localities, evidently finding the season too brief. Some of the western types have long, thin roots of undesirable character, and another local form, dwarf in growth, has small, round, and almost worthless roots. The beginner should endeavor to procure from reliable dealers the best commercial types of ginseng as a foundation for his breeding stock.

The culture of native ginseng has been too brief to induce varietal changes, but liberal fertilization and continual selection of seeds from individual plants having superior commercial characteristics will doubtless in the end favorably modify the wild type of plants.

### SUITABLE SOILS.

Ginseng grows naturally on the slopes of ravines and in other well-drained situations where the soil is formed from the acid leaf mold of hardwood forests. For cultivated ginseng the soil should be naturally dry, fairly light, and in a condition to grow good vegetables without the addition of strong manure. Very sandy soil should be avoided, as it tends to produce hard, flinty roots of inferior value. By proper treatment almost any fairly good soil can be brought into a condition suitable for ginseng. The addition of soil from the woods gives best results. For seed beds the soil should be half woods earth free from fiber, and, if inclined to be heavy, enough sand should be added so that the mixture will not bake or harden even after heavy rains.

### GROWING THE CROP.

Before the diseases of ginseng became such a menace to the industry, practical growers advised the starting of ginseng plantings with both young roots and seeds. By planting roots 3 or more years old a moderate seed crop may be had the first year, and a stock of 1-year or 2-year roots set at the same time will start the rotation which is necessary to provide for a marketable crop of roots each year after the first crop is harvested. However, the grower who purchases roots for planting incurs the risk of introducing disease into his beds, and it appears to be the better policy not to take chances with roots but to depend entirely upon seeds.

Ginseng seeds are advertised for sale by many of the older growers and are usually procurable at prices varying from 50 cents to \$1.50 per thousand. Seeds are often sold by weight, and it is estimated that 1 pound of average seed should produce 7,000 to 8,000 plants. Stratified seeds usually cost more than fresh seeds, but are regarded

as far more satisfactory for beginners. As the output of seeds is likely to become greater than is necessary to extend the plantation, it is well to restrict seed production by nipping the flower heads unless a good market for the seeds is assured. Roots gain more rapidly in size and weight if the plants are not permitted to seed.

#### PLANTING.

Ginseng seeds are best planted in spring, as early as the soil can be worked to advantage. Only cracked or partially germinated seeds should be used. They may be planted 6 inches apart each way in the permanent beds or 2 by 6 inches in seed beds, and transplanted when 2 years old to stand 6 or 8 inches apart. The seeds should be covered 1 inch deep with woods soil or old rotten hickory or basswood sawdust; that from pine or oak trees should not be used. The roots may be set any time from October to April when the soil is in suitable condition, the crowns being placed about 2 inches below the surface. Fall planting, however, is usually preferred. The most approved distances to plant are 6 or 8 inches apart each way, the latter being preferred when roots are to be grown until 7 years old.

Many planters round the surface of the beds, making the center several inches higher than the sides, since they find space for more plants on the curved than on the flat surface; but others claim that the possible injury from drought in very convex beds more than offsets this advantage. It is important, however, to have the beds well built up with centers high enough not to retain water after a rain. The paths or alleys should be much lower than the beds, and if they incline from one end to the other they will serve as surface drains during heavy rains. For roots the beds should be worked fully 12 inches deep, but the seed beds need not be so deeply stirred, as it is not advisable to have them settle to any marked extent.

#### SHADING.

Ginseng grows naturally in rather dense shade, and under cultivation must be shielded from direct sunlight by the shade of trees or by some construction that will reduce the light to about one-fourth its normal intensity. This may be accomplished by planting it in forest beds or in cultivated ground by erecting sheds open to the north and possibly to the east, but covered at the top and the south and west with laths or boards so spaced as to cut out nearly three-fourths of the sunlight. Brush and heavy burlap have been used with fair success for shading, but thin or ordinary muslins do not intercept enough light. Denser shade is required in the South than in the North. The rule appears to be one-sixth sunlight in the latitude of Kentucky and somewhat less for the South, rising to one-



fourth or more in Michigan and Wisconsin. In the North, where open construction is preferred, Lima beans or morning-glories may be planted on the south and west sides and allowed to run on poultry netting, thus furnishing shade during the brightest summer months.

There are many methods of constructing shade, but the most common is to set posts firmly in the ground 8 feet apart each way and about 7 feet high above the ground. Scantlings 2 by 4 inches in size are nailed on top of the posts, running the long way of the shed. The shade is usually made in sections 4 by 8 feet long, using common 4-foot laths or slats nailed on strips 2 by 2 inches and 8 feet long. The laths should be spaced from one-fourth to one-half inch apart, according to locality, whether in the North or in the South. These sections of shading are laid on top of the 2 by 4 inch runners and so



FIG. 3.—Lath shed affording partial shade, well suited for growing ginseng, golden-seal, and other woodland plants.

nailed to the posts that the laths run about north and south, thus giving the plants below the benefit of constantly alternating light and shade. (Fig. 3.) Owing to the high cost of lumber, some growers advocate replacing the runners with No. 4 wire, which is run over the tops of the posts and securely fastened thereto.

In the construction of artificial shade it should be borne in mind that free ventilation is very necessary for ginseng. "The higher the shade the better," is a maxim worth following, and open sides at the north and east will further promote free circulation of the air.

For covering seed beds a rather low shade is desirable, to avoid the washing out of the seeds by the drip from the laths. Poultry netting covered with brush, straw, litter, or burlap, made light in spring and denser as the sun gains power, answers very well.

The beds under shade should be 4 feet wide and preferably should run east and west, being so placed that the drip will fall to a great extent in the paths. The sides may be of 12-inch boards set 8 inches or more in the ground to keep out moles and held in place with small stakes.

#### FERTILIZING.

Several weighty arguments may be offered against the excessive use of fertilizers. Heavy feeding tends to lessen the resemblance of the cultivated root to the wild product and consequently reduces its value, since the root most closely resembling the wild in appearance and texture is now in strongest demand. Overfeeding also forces growth and thereby renders the plant less resistant to the attacks of disease. Lime and wood ashes have been used by many growers on their ginseng beds, but either root rust or fiber rot has almost invariably followed their use. Serious leaf injury has frequently followed the excessive use of nitrogenous fertilizers, and heavy applications of barnyard manure have also caused severe injury. Experienced growers are now recommending a good rich soil to start with and very moderate forcing.

The very best fertilizers are woods soil or rotted leaves 4 to 6 inches deep, well spaded in to a depth of about 8 inches, and fine raw bone meal well worked in, applied at the rate of 1 pound to each square yard. If barnyard manures are used they should be very thoroughly rotted, and in order to give the best results they should be worked in some months previous to planting the beds. Chemical fertilizers and wood ashes have been used, but as very injurious results have sometimes followed it is best, for the beginner at least, to depend on rotted leaves and raw ground bone to enrich the soil.

#### CULTIVATING.

Ginseng requires little cultivation if any, but grass and weeds should be kept out of the beds, and the surface of the soil should be scratched with a light tool whenever it shows signs of caking. Ordinarily one active man can easily care for about 2 acres of ginseng.

#### MULCHING.

In accordance with natural conditions a winter mulch over the crowns is essential, especially in northern localities. Seedling beds particularly require careful mulching to prevent heaving by frost.

Forest leaves held in place with poultry netting or light brush are best, but cornstalks stripped of the husks, bean vines, cowpea hay, buckwheat straw, or other coarse litter not containing weed seeds or material attractive to mice, will answer the purpose. The mulch should not be placed in position until actual freezing weather is imminent, and should be removed in spring before the first shoots come through the soil.

A mulch of 4 or 5 inches of leaves or their equivalent in litter is ample for the severest climate, and less is needed in the South.

#### DRAINAGE.

In laying out ginseng beds provision must be made for efficient drainage. The preferable location is on ground which has a gentle slope, but as natural drainage can not be depended upon always to remove excess water from the beds some type of underground drain must be employed. Very satisfactory results have been obtained by the use of clay or cement draintile in ginseng beds.<sup>2</sup> A line of tiles should be placed under the center of each bed. The proper depth of the drain will vary with the character of the soil, and the size of the tiles will depend upon the amount of rainfall. In general, if 3-inch tiles are used the drains should be placed 6 to 8 feet apart and 1½ to 2 feet deep in clay and 3 to 4 feet deep in sand or gravel.

#### FOREST PLANTINGS.

The earlier successes with ginseng culture were made with forest plantings, and this method is still preferred by many growers when a suitable location is available. The beds should be placed where the shade is continuous and fairly dense. The shade should be produced by tall open-headed trees rather than by undergrowth, to insure free circulation of the air. Some experienced growers prefer to plant on land which slopes to the north, thereby providing good drainage, without which ginseng will not thrive, and the coolest location during the heat of summer. The soil should be deeply plowed or spaded and all tree roots removed. The growth of these roots into the beds should be prevented by occasionally cutting around them with a sharp spade. A liberal quantity of leaf mold or well-decayed litter should be worked into the soil, and an application of bone meal raked into the surface will in most cases be a desirable addition. Ginseng may be planted closer under forest conditions than in garden culture, but in either case the closer the plants stand the greater is the danger from disease. The culture of forest beds is in all respects similar to that of beds under artificial shade, and the winter mulch should in no case be omitted.

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<sup>2</sup> For detailed information regarding tile drainage, see *Farmers' Bulletin 524*, entitled "Tile Drainage on the Farm."

## PROTECTION.

Owing to the comparatively high cost of ginseng plants and roots, the beds should be well protected by secure fences from the intrusion of wild or domestic animals, and should also be securely guarded against theft, which is not uncommon with this high-priced product. Protection is especially needed with forest plantings, which should always be well inclosed. Moles may be controlled with suitable traps,<sup>3</sup> of which several kinds are on the market, or the beds may be guarded with boards or wire netting of sufficiently close mesh set 12 to 18 inches in the ground.

## DIGGING AND DRYING THE ROOT.

The cured root is valued by the Chinese largely according to its size and maturity. The best qualities of proper age break with a somewhat soft and waxy fracture. Young and undersized roots dry hard and glassy and are regarded as less desirable. Very small roots and root fibers often realize less than a dollar a pound, while those of the proper size and quality sell readily at top quotations. Cultivated roots as a rule attain greater size than wild ones of the same age, but lack density of substance until well past the fifth year of development.

Beds should rarely be dug for market until the sixth year, and should then be taken up solidly and the undersized roots replanted or securely heeled in until time to plant in the spring. Good roots should run nearly 4 inches long, half an inch in thickness below the crown, and should average about an ounce in weight in the fresh state.

Roots may be dug at any time after growth ceases in September, but mid-October is regarded as the most favorable time. They should be carefully washed or shaken free of all adhering soil, but not scraped, as it is important to preserve the natural dusky color of the skin with its characteristic annular markings.

The older roots possess the most substance, and when properly cured realize the highest prices. It appears almost useless to offer for sale three-year or four-year roots, even if well grown and of good size, as buyers for the Chinese market have learned to discriminate against them.

Drying is best effected in a well-ventilated room heated by a stove or furnace. It has long been customary to start drying between 60° and 80° Fahrenheit, and after a few days to increase the temperature to about 90°, but some experienced growers now recommend that drying start between 100° and 110°, and as soon as the roots are wilted that the temperature be reduced to about 90° Fahrenheit.

<sup>3</sup> See Farmers' Bulletin 583, entitled "The Common Mole of Eastern United States."

The roots are spread thinly on lattice trays or shelves made of wire netting, and are frequently examined and turned, but must always be handled carefully to avoid breaking the forks or marring the surface. Roots measuring more than 2 inches in diameter will need to be dried for about 6 weeks, but smaller roots may be properly dried in less time. In all stages of curing, especially in noticeably damp weather, particular care should be taken to see that the root does not mold or sour, as any defect will greatly depress the selling price. On the other hand, overheating should be avoided, as it tends to discolor the surface and spoil the texture of the interior. Once well cured, the roots should be stored in a dry and airy place, secure from vermin, until ready for sale.

### DISEASES.

Cultivated ginseng is frequently subject to severe attacks of a number of blights, wilts, and rots, the development of which appears to be especially favored by the crowding of the plants, excess of water in the soil, and lack of proper ventilation.

In their natural state the plants as a rule are thinly scattered on the forest floor under advantageous conditions of ventilation and soil drainage, the normal action of tree roots playing no inconsiderable part in the latter condition, and diseases, of which there are several, are likely to remain quite local in effect; but under the crowded conditions of commercial culture they tend to spread and may cause material injury. Errors in fertilization and soil treatment are also frequent causes of injury, and by weakening the resistance of the plants further invite the inroads of disease.

Farmers' Bulletin 736, entitled "Ginseng Diseases and Their Control," treats of the symptoms, cause, and control of the various diseases of the ginseng plant, and prospective growers especially will find much useful information in its pages.

### YIELD AND VALUE OF THE CROP.

The yield of cultivated ginseng varies greatly and depends largely upon the suitability of the conditions under which the crop is grown and upon the skill and experience of the grower. It has been estimated that the roots from a bed measuring 4 by 16 feet, if dug when 6 years old, should weigh about 10 pounds when dry. Yields of dry root from well-managed plantings appear to be at the rate of a ton to the acre, although much larger yields are frequently reported.

Ginseng has long been valued by the Chinese for medicinal use, though rarely credited with curative virtues by the natives of other countries. The dried roots have been exported from this country in increasing quantities since the early years of the eighteenth century, the prices rising as the wild supply diminished from about 40 cents

a pound in the early years of its collection to more than \$20 a pound for the best qualities during the year 1919.

The cultivation of native ginseng, stimulated by its increasing scarcity and the rising prices, began in an experimental way about 1886 and for a time developed slowly. It is estimated that in 1901 a little less than 20 acres of ginseng were under cultivation in the United States, and of the root produced but a small quantity went into the market. In recent years the industry has attained such proportions that the output of cultivated roots appears to be considerably greater than that collected from the forests.

When cultivated ginseng first appeared on the market it sold at prices considerably higher than those paid for the wild root, but about 1904 the price declined to a figure less than that commanded by wild ginseng and since that time has continuously remained at a lower level. The preference in the Chinese markets for wild ginseng over the American cultivated root, which has greatly increased during recent years, is largely responsible for the constantly increasing difference in the prices offered for wild and cultivated ginseng in the markets of the United States.

A negligible quantity of ginseng root is consumed by Chinese residents of North America, and a trifle has been used by manufacturers of domestic medicine, leaving practically the sole outlet for their product with the Koreans and Asiatic Chinese. The domestic prices, exports, and valuation of American ginseng for the 20 years ended June 30, 1919, are shown in Table I.

TABLE I.—*Domestic prices, exports, and value of American ginseng from 1900 to 1919, inclusive.*

Year.	Domestic prices (per pound). <sup>1</sup>				Exports. <sup>2</sup>		
	Wild root.		Cultivated root.		Pounds.	Total value.	Average value per pound.
	High.	Low.	High.	Low.			
1900.....	\$6.10	\$2.75	\$7.00	\$4.00	160,901	\$833,710	\$5.18
1901.....	8.75	3.75	10.00	5.75	149,069	801,672	5.38
1902.....	6.35	3.00	8.00	3.00	154,063	856,515	5.55
1903.....	7.50	4.00	7.50	5.25	151,985	796,008	5.23
1904.....	8.10	5.00	8.00	7.00	131,882	851,820	6.45
1905.....	7.50	6.00	.....	.....	146,576	1,069,849	7.29
1906.....	7.50	6.00	7.00	4.00	160,949	1,175,844	7.30
1907.....	7.00	5.00	6.25	3.00	117,696	813,023	6.90
1908.....	7.00	4.50	6.25	4.00	154,180	1,111,994	7.21
1909.....	8.00	5.40	7.25	5.00	186,257	1,270,179	6.82
1910.....	8.00	5.50	7.25	5.00	192,406	1,439,434	7.48
1911.....	7.50	5.00	7.00	5.00	153,999	1,088,202	7.06
1912.....	9.00	5.00	7.50	3.00	155,308	1,119,301	7.20
1913.....	10.00	6.00	6.50	3.00	221,901	1,665,731	7.50
1914.....	11.50	6.00	8.00	3.00	224,605	1,832,686	8.15
1915.....	9.50	4.50	7.00	2.00	103,184	919,331	8.91
1916.....	11.00	5.00	6.50	3.00	256,082	1,597,508	6.23
1917.....	14.00	6.00	7.00	2.50	198,480	1,386,203	6.98
1918.....	19.00	9.50	9.00	3.00	259,892	1,717,548	6.60
1919.....	23.00	13.00	12.50	3.00	282,043	2,057,260	7.29

<sup>1</sup> Prices for 1900 to 1906 were obtained from dealers in Cincinnati, Ohio; prices for 1907 to 1919 were compiled from Hunter-Trader-Trapper.

<sup>2</sup> From Annual Reports of Foreign Commerce and Navigation of the United States.

## THE OUTLOOK FOR THE INDUSTRY.

The future success of cultivated ginseng in America will be determined to a great extent by the attitude of the growers. If the lessons taught by the experience of the preceding 20 years are heeded, the mistakes of the past need not be repeated, and many obstacles which have heretofore hampered the progress of the industry can be removed.

The industry still suffers from the disrepute into which it was brought through the exaggerated claims made by many dealers in seeds and nursery stock with regard to the possibilities for unusually large profits in the growing of ginseng. Although ginseng is a comparatively unimportant product in this country, it has a place among minor crops of recognized value. For every dollar's worth of ginseng exported in 1919 there were produced in this country about \$38 worth of peanuts, \$13 worth of onions, \$11 worth of hops, \$6 worth of strawberries, and \$1.30 worth of olives.

In comparison with other crops, the market outlet for ginseng is small; consequently, the industry affords an opportunity only for a limited number of persons without danger of its becoming overcrowded. Since yields of the dry root from well-managed plantings appear to be at the rate of a ton to the acre, about 100 acres of mature ginseng could very readily supply 204,780 pounds of root, which is the average exportation for the last 10 years. This would represent total plantings of nearly 700 acres, as it requires at least 6 years to grow marketable roots from seed.

The Chinese market formerly absorbed ginseng in quantities considerably in excess of the average exportations for the two decades just past. As shown in Table II, the number of pounds exported during the last 10 years is less than half of the exports for the 10 years 1860-1869, inclusive, while the average price per pound for the 10 years 1910-1919, inclusive, is nearly eight times greater than it was some 60 years ago. Since the exports of ginseng appear to be increasing in volume, notwithstanding the relatively high prices now paid for the root, a continuance of the demand for the American product may be reasonably expected.

TABLE II.—*Exports and value of American ginseng by decades, 1860 to 1919, inclusive.*

Exports for the 10 years.	Pounds.	Value.	Average value per pound.
1860 to 1869	4,149,445	\$3,902,209	\$0.94
1870 to 1879	4,041,727	4,537,008	1.12
1880 to 1889	3,457,294	6,771,830	1.95
1890 to 1899	2,163,302	7,843,888	3.62
1900 to 1909	1,513,558	9,610,614	6.34
1910 to 1919	2,047,800	14,823,781	7.24

The evident preference of the Chinese for the wild root and the unsatisfactory state of the general market for cultivated ginseng have caused grave doubts as to the future prospects of the industry. These doubts will probably be realized unless growers give more attention to the production of the type of root desired by the Chinese trade. In the future, growers should strive for quality of product and not for quantity of production, as has been the all too common practice in the past. There is always a ready sale for the cultivated roots which closely resemble the wild in quality and condition, and prudent growers will not fail to adopt the wild root as the standard of future production. The elimination of the poorer grades of cultivated American ginseng which are now found in the markets would tend to insure more uniform prices for the root and to lessen the danger of depressing the market through overproduction.



